AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions of claims in the application.

1. (Original): A distance image sensor for projecting light from a light source to an object intermittently and measuring the distance by the delay time of the reflected light thereof, comprising:

a photo-detector (PD) having a photo-diode structure buried in a semiconductor substrate for converting reflected light from an object into charges;

a plurality of gate means (G1, G2) having an MOS (Metal Oxide Semiconductor) structure on a semiconductor substrate;

a plurality of charge storage nodes (C1, C2); and

control means (6) for controlling the switching of said gate means, characterized in that

to at least two of said charge storage nodes, that is a first charge storage node and a second charge storage node, charges from said photo-detector are alternately transferred and stored, synchronizing the light intermittent operation from said light source, by said gate means, that is a first gate means and a second gate means, so that the charge transfer efficiency from said photo-detector is improved and the distance to the object is determined using the distribution ratio of the stored charges.

2. (Original): The distance image sensor according to Claim 1, further comprising a third gate (G3) means in a third charge storage node (C3), characterized in that when reflected light by projected light does not exist, charges by background light are transferred to said third charge

storage node by opening said third gate means, so that the charges are stored in said third charge storage node for removing background light.

3. (Currently amended): The distance image sensor according to Claim 1 ~~or Claim 2~~, further comprising sampling & hold means corresponding to each of said charge storage nodes.

4. (Original): A distance image sensor for projecting light from a light source to an object intermittently and measuring the distance by the delay time of the reflected light thereof, comprising:

a photo-detector for converting reflected light from an object into charges;

an inversion amplifier to which signal charges from said photo-detector are input;

a first serial circuit further comprising a first capacitor (C1) and first switching means (ϕ1) connected to said first capacitor in series;

a second serial circuit further comprising a second capacitor (C2) and second switching means (ϕ2) connected to said second capacitor in series; and

control means (6) for controlling the switching of said first and second switching means, characterized in that

said first serial circuit is connected between the output and the input of said inversion amplifier, and said second serial circuit is connected between the output and the input of said inversion amplifier to construct a negative feedback amplifier, signal charges which depend on the delay time of the reflected light from an object are distributed to said first capacitor and said second

capacitor by switching of said first and second switching means, so that the charge transfer efficiency from said photo-detector is improved and information on distance to the object is acquired from the charges stored in said first and second capacitors.

5. (Original): The distance image sensor according to Claim 4, further comprising a third serial circuit which comprises a third capacitor (C3) and third switching means (ϕ3) connected to said third capacitor in series, characterized in that charges by background light are transferred to said third capacitor by closing said third switching means when the reflected light by the projected light does not exist, so that the charges are stored in said third capacitor for removing the background light.

6. (Currently amended): The distance image sensor according to Claim 4 ~~or Claim 5~~, further comprising n (n = 2 or 3) number of gates and n number of capacitors for holding, characterized in that the r (r = 1, 2, . . . n)-th capacitor for holding is connected to the output of said inversion amplifier via the r-th gate, the charges stored in said r-th capacitor are transferred to said r-th capacitor for holding by opening said r-th gate corresponding to the closing of said r-th switching means, and sampling & holding operation of charges is performed, so that calculation is enabled for all the pixels simultaneously.

7. (Currently amended): The distance image sensor according to ~~Claims, 1, 2, 4 or 5~~ Claim 1, characterized in that a brightness image signal is acquired from the sum of the charges stored in

said first and second capacitors or storage nodes, the sum of charges stored in said first to third capacitors or storage nodes, or charges stored in said third capacitor or storage node.

8. (Currently amended): The distance image sensor according to Claim 1 ~~or Claim 4~~, further comprising voltage control delay means for passing signals for controlling the switching of said first and second gate means or switching means, characterized in that a signal based on the difference of the charges stored in said storage node or capacitor is supplied to said voltage control delay means as a control signal with polarity where said difference of charges approaches zero, so as to form a negative feedback loop.

9. (Currently amended): The distance image sensor according to Claim 1 ~~or Claim 4~~, characterized in that the pulse width for receiving the projection light, that is the period when said gate is open, or the period when said switching means is closed, is sufficiently short with respect to the repeat cycle.

10. (Original): The distance image sensor according to Claim 9, comprising reset means for clearing the charges by the background light synchronizing each cycle of the repeat cycle of the projection light.

11. (Currently amended): The distance image sensor according to Claim 1 ~~or Claim 4~~, characterized in that said control means controls said gate means or switching means so that the charges at the moment when the reflected light rises are stored in said first charge storage node or capacitor, and charges after reflected light is at a stable level are stored in said second charge storage node or capacitor.

12. (New): The distance image sensor according to Claim 4, characterized in that a brightness image signal is acquired from the sum of the charges stored in said first and second capacitors or storage nodes, the sum of charges stored in said first to third capacitors or storage nodes, or charges stored in said third capacitor or storage node.

13. (New): The distance image sensor according to Claim 4, further comprising voltage control delay means for passing signals for controlling the switching of said first and second gate means or switching means, characterized in that a signal based on the difference of the charges stored in said storage node or capacitor is supplied to said voltage control delay means as a control signal with polarity where said difference of charges approaches zero, so as to form a negative feedback loop.

14. (New): The distance image sensor according to Claim 4, characterized in that the pulse width for receiving the projection light, that is the period when said gate is open, or the period when said switching means is closed, is sufficiently short with respect to the repeat cycle.

15. (New): The distance image sensor according to Claim 14, comprising reset means for clearing the charges by the background light synchronizing each cycle of the repeat cycle of the projection light.

16. (New): The distance image sensor according to Claim 4, characterized in that said control means controls said gate means or switching means so that the charges at the moment when the reflected light rises are stored in said first charge storage node or capacitor, and charges after reflected light is at a stable level are stored in said second charge storage node or capacitor.